Sensitivity to Parental Play Beliefs and Mediation in Young Children's Hybrid Play Activities

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ABSTRACT

Supporting young children's play in the digital world is a challenging endeavor. Little is known, however, about the parental beliefs and mediation practices regarding children's facilitated play in hybrid (mixed digital/physical) environments and how one can account for this through design. Following a Value Sensitive Design approach, we performed: 1) a conceptual literature investigation, 2) an empirical survey with 1398 parents of child(ren) aged 4-6 years, and 3) a technical investigation on online customer reviews of hybrid playful products for children. Our findings reveal the role of parents' mediation and beliefs in shaping young children's play. We provide designers with guidance to be accountable of the way design properties can foster parental play beliefs and support adult-child interaction. We conclude that young children's facilitated play in hybrid environments is shaped by both the social context in which it is enacted and the affordances provided through design.

Categories and Subject Descriptors

H.5.2 [**User Interfaces**]: User-centered design.

General Terms

Design, Human Factors.

Keywords

Play, Facilitation, Parents, Intergenerational, Design, Research

1. INTRODUCTION

Play experiences come in many forms. The diversity of play is illustrated by Sutton-Smith [19] who dedicates an entire work to its ambiguities. In his book's introduction, he observes that although we have all engaged in it as children and adults, we find play difficult to define. This is not surprising as "Almost anything can allow play to occur within its boundaries…" [19, p.3].

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Play experiences can indeed surround different settings, media and objects, both of a physical and digital nature. In the current paper, we will focus on young children's *hybrid play* experiences as a form of *facilitated play*.

Hybrid play challenges a strict dichotomy between physical and digital, non-mediated and mediated play by resting on "the intersection of material and digital – traditional toys and digital games" [20, p.238]. As Tyni, Kultima and Mäyrä [19] point out hybrid play products, such as Invizimals and Skylanders, seem to present a middle-ground. They appear to form an opportunity to combine the best of both sides, which is of interest both from a cultural and commercial perspective.

Several authors have tried to define and classify hybrid play and games, also referred to as mixed or trans-reality play and games [13, 18]. Tyni, Kultima and Mäyrä [20] distinguish two dimensions: synchronicity and dependency. These refer to the extent to which the digital and physical experiences coincide, and the extent to which one can have a meaningful play experience without either the digital or material component, respectively.

Regardless of whether play practices revolve around material or digital objects and environments or both, they are all part of what Lauwaert [12] describes as geographies of facilitated play. She defines this facilitation as "…making (an action or process) easy or easier, possible, smooth or smoother. To facilitate is to enable and assist but also to promote, encourage and catalyze. Facilitated play practices are shaped by the combination of design characteristics of a toy and the discourse surrounding the toy" [12, p.12]. Lauwaert [12] argues that play practices can be situated either within the core of what the designers intended, but also involve interactions that are far removed from those intentions. These peripheral play practices show how people make toys and games their own, rather than purely 'consuming' them.

In addition to technology, young children's facilitated play is also shaped by the social context in which it takes place. In a pre-school setting, practitioners provide children with individual and joint play activities and materials, considering them as instrumental to children's learning (see, for example, [17]). In a family context, parents and grandparents are not only important decision-makers in what toys or games children play with, but can also become play buddies (e.g. [21]) alongside children's siblings and peers.

In the current paper, we concentrate on the involvement of parents in young children's play. In particular, we explore parents' perceptions of play and parental involvement in shaping young children's (4–6y) facilitated play.

This paper makes an important contribution to the design of hybrid play for children, by considering how hybrid playful products or environments can support different parental play beliefs, mediation styles and roles. To our knowledge, this paper constitutes a first attempt in this regard.

2. ADULT FACILITATION OF PLAY

The studies by Fisher et al. [5] and McInnes and Birdsey [15] constitute rare examples of research into the perception of play by parents. Their work suggests that adult beliefs concerning play have important implications for children's play activities.

Looking at mothers' perception of play using a survey-based approach, Fisher and colleagues [5] found that mothers who attribute a stronger educational value to play activities also report those play activities to be more frequent.

McInnes and Birdsey [15] report more comprehensive work, consulting also - in addition to parents - teachers, children and adolescents via questionnaires and interviews. They expose interesting differences between these actors' play beliefs. They find that, unlike adults, children do not tend to differentiate between play activities. They also associate play with the absence of adults, meaning that adults seeking to facilitate play may undermine it, unless they adopt a playful attitude themselves. Finally, parents appear to emphasize benefits of play in terms of social and emotional development, whereas teachers are more convinced of its educational value, particularly when they structure the play activities.

The aforementioned studies looked at play beliefs in general, but tell us little about how these beliefs extend to children's play that is facilitated by technology, and by hybrid products, in particular. Furthermore, these studies do not explore how playful technologies may facilitate a type of play that either matches or conflicts with parents play beliefs. This brings us to the first two-folded research question that we will address in this paper:

RQ1: Play beliefs

(a) What beliefs do parents hold concerning young children's facilitated play?

(b) How may hybrid playful products support these play beliefs?

Parents may both unconsciously and consciously exert influence on to what extent and how their children play with hybrid products. Parental mediation research is insightful in this regard. It typically looks at how parents mediate their children's technology use, including play and gaming, in light of the possible benefits or risks that they attribute to it.

At least three different parental mediation styles can be identified based on prior research: "Restrictive mediation involves exercising control over the amount of time children spend on media and the content they are allowed to use. Active mediation is instructive or normative, and extends to sharing critical comments, including an explanation of complex content. Co-use, finally, amounts to watching or playing together as a deliberate strategy to share children's media usage." [16, p.252].

Surveying parents about their young children's internet use (2-12y), Nikken and Jansz [16] identify a fourth style called supervision, which means that parents are present while the child is online. They find that overall parents of young children tend to rely mostly on supervision, which allows them to combine mediation with household chores. With regard to playing casual games online, co-use and the use of general regulations occur relatively more often than in the case of console games. Casual games apparently present an opportunity for parents to engage in a practice with their children that they both can enjoy. At the same time, it also comes with concerns in terms of, for example, time spent on it.

For a more in-depth investigation of the dyadic interaction between adult family members and children during play, the work by Davis and colleagues is of note. Davis et al. [3] observed play between children and their grandparents in playgroups. According to their findings, grandparents mainly maintain a safe and caring environment by coordinating and watching play rather than actively engaging in it. When they do actively join in, play tends to be brief and more open-ended. The researchers emphasize that throughout intergenerational play, children and grandparents take on both more traditional roles (e.g., grandchild as apprentice and grandparent as instructor) as well as relatively unexpected, non-traditional roles (e.g., grandparent as teaser and grandchild as resistor).

We wanted to follow up on the above research on parental mediation and intergenerational play, getting a more detailed view on parent's mediation strategies for four to six year old children in particular. Similar to play beliefs, we were also interested to see how hybrid playful products may shape different mediation styles and types of interaction between (grand)parents during play. This is articulated in our second two-folded research question:

RQ2: Play mediation

(a) How do parents mediate and engage with young children's facilitated play and related technology use?

(b) How may hybrid playful products shape adult involvement with children during play?

In order to address these questions, we conducted both an empirical as well as a technical investigation as will be discussed in the following section.

3. METHOD

Our research approach draws from a tripartite methodology inherent to what is known as Value Sensitive Design [6]. Value Sensitive Design (VSD) is a theoretically grounded approach, which aims to account for human values over the course of a design trajectory by conducting iterations of three types of investigation:

- Conceptual investigation: Focused on developing a conceptual framework through literature study that enables to identify and understand who we are designing for and the values these stakeholders might hold that are critical to using the technology under development.
- Empirical investigation: Emphasis on gaining more knowledge of the individuals or groups making use of the technology and the sociocultural context they use it in, through surveys, observations or other empirical methods.
- Technical investigation: Zooms in on the technology at hand, e.g., by means of technology reviews or prototyping, to establish characteristics and mechanisms through which the technology may facilitate or conflict with human values.

Applying VSD in the strict sense would have led us to focus exclusively on values, which can be understood in a descriptive sense, as what a person or group of people consider to be important, or in a more normative sense, what people feel is right

or appropriate [7, 11, 14]. Instead, we adopted a broader approach, paying attention to play beliefs - which encompass values both in a descriptive and normative sense - and parental mediation through which those beliefs are enacted. Based on the literature in the previous section, we argue that sensitivity to both is required when designing playful products for young children.

The given study is part of a design research project, called WOOPI, which aims to explore meaningful hybrid play experiences for young children (four to six years old) by combining a digital environment with physical cards and toys. As social scientists, we were part of a consortium joining academic and industry partners.

The work discussed in the current paper presents *a first completed wave* of three types of investigation. During this research wave, we focused primarily on parents as direct stakeholders in the design of hybrid playful products for young children. The goal is to follow-up with similar investigations including the play beliefs and roles of children, peers and educators.

3.1 Conceptual investigation

The conceptual investigation was described in Section 2. As can be seen, it served as a means to delineate our research questions and theoretically ground the empirical and technical investigations. In what follows, we describe the particular methods used during the latter investigations, which enabled us to provide a preliminary answer on the research questions stated in Section 2.

3.2 Empirical investigation

Our empirical investigation served to complement findings from the literature. As such, we hoped to shed additional light on parental beliefs on and mediation of young children's play (i.e. RQ1a and RQ2a).

We conducted a survey directed towards parents with at least one child between the ages of four to six. This survey encompassed various questions relevant for the project consortium. Beyond inquiring into basic demographic information, it also addressed tablet and smartphone usage, collectible card trading practices, play practices, and adult attitudes towards and mediation of those practices.

The call for participation in the survey was sent out to 38230 recipients in Belgium (Flanders) through the mailing list of one of the consortium partners. A total of 2177 parents participated in the online survey, which resulted in 1398 completed entries of parents with at least one child between four and six years old.

The majority of the participants were female (n = 1220; 87%) and the average age was 34 years old (SD = 4.51). The youngest participant was 21 and the oldest 52. In virtually all cases (n = 1391; 99%) Dutch was reported to be spoken at home. Parents were asked to answer question with one of their children in mind, aged between four to six. 45% of those children were reported to be boys (n = 630), and 55% were reported to be girls (n = 768).

In most cases, there was access to a computer (n = 1365; 98%), digital tablet (n = 1202; 86%) or smartphone (n = 1213; 87%) at home. In 91% of the families with a digital tablet, this device is also used by the children between four and six years old (n = 1096; 78%). For families owning a computer or smartphone, the four to six year-olds use it only in, resp., 47% (n = 636; 45%) and 39% of those cases (n = 471; 34%).

3.3 Technical investigation

While the survey enabled us to gain further insight into parental play beliefs and mediation, we realized that it was not a suitable instrument to address the specific role of hybrid playful products. Indeed, hybrid play is a broad concept that cannot easily be conveyed and discussed by means of a survey.

Hence, we selected another procedure to assess how hybrid toys and games could support particular play beliefs and forms of parental involvement (i.e., RQ1b and RQ2b). More particularly, we analyzed online customer reviews of hybrid playful products for children. In such reviews, the properties of hybrid playful products are described from the perspective of adults based on their experiences with these products.

We selected cases from a list of hybrid playful products gathered by researchers in the Hybridex project. The Hybridex project focused on entertainment products that combine physical and digital user experiences. As such, this list of cases provided a relevant starting point for our own search for cases [9]. From this list, we selected cases of which the target audience included four, five or six year old children. This means that a toy for ages 5+, for example, would be included.

Customer reviews of these products were collected from amazon.com, the largest online retailer in the US. It provides the opportunity for customers to give feedback about products and vote about the helpfulness of other people's feedback. For every selected product, we conducted a qualitative analysis of the top-10 customer reviews, sorted by most helpful. This was on average 9,4 percent of the total amount of reviews per product. The reviews were coded bottom-up, yielding descriptive codes on actors involved, aspects of children's play, and types of intergenerational interaction. In total, 270 reviews for 27 different hybrid playful products were analyzed.

4. FINDINGS

In what follows, we discuss the findings from our empirical and technical investigations in response to the research questions identified in Section 2.

We first address parental beliefs concerning play (cf. RQ1a and RQ1b). In particular, our empirical investigation brings to light benefits attributed by parents to facilitated play and our technical investigation reveals how hybrid playful products may support these perceived benefits.

Secondly, we elaborate on parental involvement in facilitated play (cf. RQ2a and RQ2b). Here, we discuss what we learned from the survey with regard to parental mediation of four to six year old children's play and technology use. The results from the technical investigation then show how hybrid playful products can promote different forms of parental involvement.

4.1 Play beliefs

Our empirical and technical investigations help us to articulate the benefits that parents attribute to facilitated play and how hybrid play technologies may support those beliefs.

In this and the following section (4.2), we will first describe the outcomes of the empirical investigation, followed by the findings of the technical investigation. In Annex 8.1, the reader can find an overview of the survey questions of which results are discussed in this paper. In the remainder of this paper, superscripts q1 to q7, have been used in the text to refer to the corresponding questions.

In the survey that was part of our empirical investigation, we probed parents' attitudes towards physical and digital forms of play. When asked for their preference, the majority (n = 976, 70%) chose physical or material play over digital [q1]. The rationale provided includes various benefits attributed to physical play in terms of physical activity and health (e.g., spending active time away from the screen), social and emotional development (e.g., playing together), and creativity and imagination [q2]. The few respondents who preferred digitally enabled play (n = 68; 5%) do so for its capacity to increase digital skills.

The aforementioned benefits re-appear in our technological investigation where we analyzed customer reviews of hybrid playful products. For more information on these products, we refer the reader to Annex 8.2. The physical and spatial properties of these products were mentioned as a means to get children moving and 'release' them from the screen. The use of tangible objects was also mentioned to enhance reflective behavior when interacting with the screen (Ex. 1).

Ex. 1 (A father on Tiggly Counts) "And it's so great to see him not just tapping on the screen but actually thoughtfully placing the toys down when he thinks it's the right answer"

A number of products are lauded for their ability to teach children motor skills and cognitive skills (for instance, problem-solving when they require children to try out different solutions through a trial-and-error approach). Furthermore, it is suggested that when toys involve learning activities, parents' concerns and measures about screen-time may be alleviated (Ex. 2).

Ex. 2 (An aunt on Tiggly Counts) "My 4-year old niece loves these new toys! She loves playing with her iPad, but my brother usually limits her screen time, so these toys are really great for both of them! My niece enjoys playing with the ipad while my brother is not worried about her spending too much time with her iPad since she is learning her numbers and playing with real toys at the same time. She got it and couldn't stop playing for hours with all three apps!"

Some parents pick up the fact that playful technologies promote social interaction and cooperation among children or provide a virtual companion, which children can cherish and care for (Ex. 3). Such features can be seen as beneficial for social and emotional development.

Ex. 3 (A parent about Eyepet – PS3) "Eyepet is perfect for her. The wand is easy to use for her and the game is really cute. She loves dressing in the different wacky outfits and giving it a bath. I hope PS3 comes out with more younger kid friendly games for the MOVE."

Certain hybrid play products involving construction sets were appreciated because they are believed to spark personal creativity and imagination. In the following instance (Ex. 4), playing with a hybrid building set with a limited set of possibilities, led to playing with LEGO where possibilities are less constrained.

Ex. 4 (A father about Laser Pegs 8-in-1 Sports Car Building Set) "We (me and my son) didn't stop there. After we finished making all 8 of them, my son used a few of his old legos and built a car out of his own imagination. How great is that!? Now he plays with it all day which keeps him busy all day and he loves it."

Some parents also recognize the creativity that children show in making a hybrid playful product their own (Ex. 5). Particularly, when the physical and digital play components are less dependent on each other, children are easily able to 'remix' them by using other physical toys or even household items in relation to the overall play experience. In the Angry Bird Action game, for example, which like the digital version allows players to catapult birds towards pigs, only three wooden blocks are included in the base game. But this was not an issue for the following parent.

Ex. 5 (A mother about the Angry Birds Action game) "The blocks are standard, natural wood blocks - nothing too amazing. You can stack the blocks a bunch of different ways but don't be surprised when your kids get inventive and find all kinds of other things to stack on the mat to set the pig on."

As the above example shows, a limited set of physical objects in the original product package is not necessarily perceived as a problem, when a work-around is possible.

4.2 Mediation styles and interaction roles

Our empirical and technical investigations allow us to refine our understanding of parental mediation in relation to young children (4-6y) and of how hybrid play technology may promote particular types of intergenerational interaction, respectively,

The survey results from our empirical investigation show that parents most often supervise their four- to six-year-olds during digital media use [q3], which is in line with the findings of Nikken and Jansz [16]. Moreover, when engaging in co-use, children usually tend to be the initiator of this joint play. In terms of restrictions, most parents limit the screen-time children get on tablets and smartphones. For example, 59% of the participants, owning a tablet used by their child, limit uninterrupted tablet use to 15 to 30 minutes (n = 647; 46%) [q4]. Furthermore, control over the installation of applications rests mostly with the parents, rarely with the children themselves. When children are allowed to install apps on tablets (n = 180; 13%) or smartphones (n = 57; 4%) [q5], the majority has to request permission first (resp., n = 131 and n = 38, i.e. 73% and 67% of those that are allowed) [q6].

With regard to the different actors involved in mediating children's digital media use and literacy [q7], school (M = 4.5; SD = 0.59) and parents (M = 4.1; SD = 0.69) are attributed the largest role in guiding their children in the digital world. Peers are deemed significantly less important than school and parents in this matter (M = 3.3; SD = 0.90).

Our technical investigation sheds further light on how and to what extent playful hybrid products shape adult's involvement in facilitated play. Some of the customer reviews we analyzed illustrate, for instance, how technology may necessitate adult involvement. Certain hybrid play products require the use of tablet or smartphone. Young children often do not have their own mobile device and depend on adults to share their device (Ex. 6).

Ex. 6 (A parent about Sphero 2.0) "My kids love playing with it and using my iPhone or tablet to roll the Sphero around the house."

In addition, it was frequently mentioned that adults needed to help children with the hybrid play products. This ranges from setting things up (e.g., downloading the app, setting up an account, connecting toys and devices) to providing support during play activities (Ex. 7).

Ex. 7 (A grandmother on Laser Pegs 8-in-1 Sports Car Building Set) "Small parts, and the need for some finer motor skills than my grandson currently possesses, allowed Papa to build with him. Thus, the 'Laser Pegs 8-in-1 Building Set' is great for intergenerational activity and helps strengthen bonds between parents or grandparents and their children."

As shown in this example, properties requiring help may be appreciated as a means for adult-child interaction and to strengthen intergenerational bonds. However, they may also be considered to be a disadvantage when adults were hoping the toy or game would keep children occupied (Ex. 8). Indeed, some products are praised precisely because they keep children busy when adults are involved in other activities, for instance, while traveling by car.

Ex. 8 (A mother about Ubooly) "The ONLY reason I did not give Ubooly 5 stars is because it does require parental supervision for my 3-year-olds (they just turned 3). So, if you have younger kids, you will need to help them sometimes and explain some things to them, which I wasn't totally expecting."

Most often, adults mention the fact that the hybrid toys and games give them the opportunity to spend a pleasant time with the children. This appears to be due to the fact that they appreciate the quality time together, but also enjoy playing with the products themselves. In fact, some parents acknowledge they became so enchanted with a product that they started playing with it, by themselves (Ex. 9).

Ex. 9 (A mother about Sphero 2.0) "It was so much fun I had to get one for myself, lol. Now we have 3 Spheros running around the house. I'm already up to level 13 on my level ups and have unlocked all the cute tricks (cores)."

Finally, we did not only observe appreciation for creativity in children's appropriation of playful products, we also found accounts of adults participating in such forms of appropriative play. For instance, the robotic ball, Sphero 1, affords a very broad range of structured and unstructured play activities. It can be played with through existing mobile apps that heavily structure game-play, but can also be part of self-invented play activities, which the following father joined in on (Ex. 10).

Ex. 10 (A father about Sphero 1) "There are so many different apps and games that you can play with it that they haven't gotten bored yet! We have actually been having a lot of fun coming up with our own games to play with Sphero as well."

5. DISCUSSION

We will now deal with the design implications of our findings, before reflecting on our methodology and pointing out future research steps.

The previous section highlighted particular parental play beliefs (i.e. perceived benefits) and types of parental involvement in relation to facilitated play. Findings also helped us recognize that hybrid playful products can support these benefits and types of parent-child interaction to a greater and lesser extent. In this section, we offer an instrument that helps designers account for these findings.

5.1 Design implications for hybrid play

In this section, we discuss the design implications of our findings. We hereby aim to provide designers of hybrid play with an instrument that aims to (1) promote sensitivity to the various parental benefits attributed to children's facilitated play and types of parental involvement, and (2) help them to identify their own position and focus in relation to these sensitivities. This way, they can become more accountable in the decisions they make as to which play beliefs and forms of parental participation are to be supported in the design. Figures 1 and 2 illustrate this instrument, which we will discuss in more detail in the following two sections.

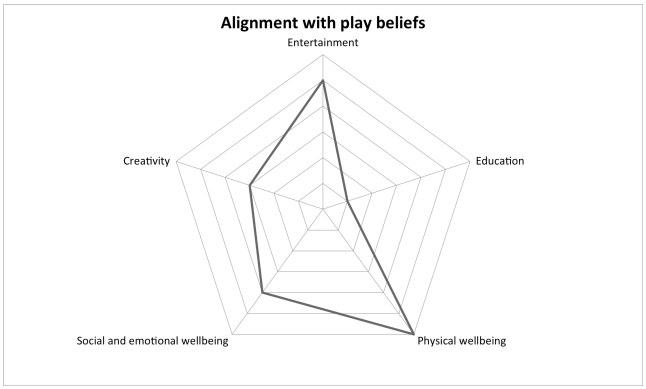

Figure 1. Alignment with parental play beliefs

5.1.1 Alignment with play beliefs

When working on hybrid playful products, designers may pursue the following benefits attributed to play by parents to a greater or lesser extent:

1. **Entertainment:** Emphasizing fun and amusement, where play activities are focused on keeping children entertained, occupied or diverted.
2. **Education**: Emphasizing the educational value of play by addressing the development of cognitive, motor or digital skills, for example, by including problem-solving activities where physical toys need to be matched with a digital configuration.
3. **Physical wellbeing**: Emphasizing physical wellbeing by encouraging children to be physically active, keeping time spent looking at a device screen in check, and providing an overall safe activity that limits risks of physical harm.
4. **Social and emotional wellbeing**: Emphasizing social and emotional wellbeing by promoting social interaction, either with other children or with the technology as social actor (e.g. a digital, physical or hybrid companion).
5. **Creativity**: Emphasizing creative aspects of play by including productive play activities (e.g., building and storytelling) and facilitating re-mixing of physical and digital play components and other forms of appropriation.

These benefits are not mutually exclusive. A toy might be envisioned, for instance, that requires cooperation (i.e. social benefit) between children to solve particular problems (i.e. educational benefit). They can each be pursued to a greater or lesser extent.

Using a radar chart, designers can visualize their position as illustrated in Figure 1. The bold lines represent example data. The fabricated data, in this example, could represent a designer's analysis of a first playful prototype that she or he created, showing that it emphasizes physical wellbeing, whereas educational benefits were hardly considered. The radar chart could also be used earlier in the design process, when setting the design goals.

We note that the aforementioned benefits can also be accomplished in different ways. Zooming in on creative qualities of play, for instance, productive practices can lie at the heart of the playful technology itself (see, for example the work of Cassell and Ryokai [2], on technologies that support fantasy and storytelling). Creativity can also express itself in the way children and adults make the playful product their own. Observing such

often unexpected, idiosyncratic uses can be highly insightful. This process of appropriation, as Dourish argues, "is similar to customization, but concerns the adoption patterns of technology and the transformation of practice at a deeper level. Understanding appropriation is a key problem for developing interactive systems, since it critical to the success of technology deployment." [4, p.465]

5.1.2 Support for child-adult interaction

Overall, the following types of parental involvement can be (more or less) accounted for in the design of hybrid playful products:

1. **Supervision:** Positioning parents as supervisors by helping them to keep an eye on play activities, either while co-located or through remote monitoring, and supporting children's single or peer-to-peer play.
2. **Control**: Positioning parents as gatekeepers by enabling them to grant access to play devices and activities and necessitating adult intervention to set up play activities (e.g. to connect the physical toy and digital device).
3. **Care**: Positioning parents as caregivers by involving them in setting up the play environment and inviting them as audience for children, possibly promoting more 'performative' aspects of children's play activities.
4. **Play**: Positioning parents as play buddies by actively engaging them in the play activities and considering how these activities can be appealing both for children as well as adults.
5. **Instruction**: Positioning parents as guides throughout playful experiences by introducing entry points during play activities where adults can pass on skills and knowledge to children.

Similar to the approach for play beliefs, researchers and designers can use Figure 2 as a lens to position their own work and establish which types of parental involvement they have focused on. Note that the plotted data again are example data, to show what a finished chart could look like. In this illustration, the radar chart represents a position that places most emphasis on parental control.

When using the design instrument, it is important to understand that how parents mediate and participate in young children's facilitated play activities depends both on the affordances of the playful product itself (e.g., does the play experience appeal to adults as well) and on circumstance (e.g., parents being occupied with other activities such as work and household-related activities).

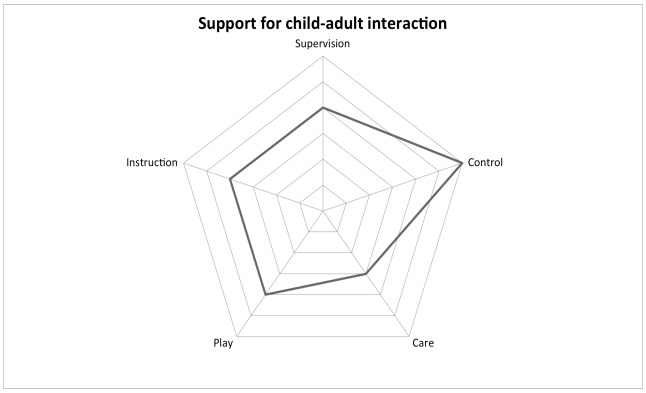

Figure 2. Support for parent-child interaction

5.2 Methodological reflection

Value Sensitive Design (VSD) has been criticized for being a top-down approach, which gives too much weight to the voice of the researchers in design projects [1]. Because of this, researchers involved in VSD-based studies, should heed the risk of ventriloquism in which the researcher's view is stated as if articulated by stakeholders. While we took care to avoid this in our own study, it is a fact that the two sensitizing concepts that we identified, parental play beliefs and mediation styles, had a pivotal role in how we collected and interpreted the data. It may have also caused us to neglect other aspects that are important, either from the point of research (e.g., the role digital literacy) and from the perspective of parents' themselves. Moreover, at this point we have focused exclusively on parents, looking at children's play from their point of view, not including children themselves or educators who are also important stakeholders.

As noted earlier, we did not apply VSD in the strict sense. Instead, we adopted a broader approach, paying attention to play beliefs and parental mediation through which those beliefs are enacted. Here, we note another difference as well. Whereas Friedman et al [7] hold a rather static notion of values, we see values as being situated, specific and dynamic (in line with [8, 10]). As such, designing playful (hybrid) interactions is not simply a question of identifying values and then designing for them, but a process that reformulates values. To accomplish this, we should investigate how play beliefs and values are put into everyday practice and, afterwards, identify potential value conflicts between different stakeholder groups (e.g. children, parents, educators, designers/researchers). This will require additional VSD iterations.

In light of the previous observations, the design instrument provided in this paper should be seen as a guide for designers to pay attention to how they position parental involvement in their design and which benefits they emphasize. It can help designers to remain mindful of this throughout the whole design process from conceptualization to evaluation and compare their perspective with that of other stakeholders. It is not a recipe that specifies what designers should do to guarantee the success of their hybrid toy or game.

A final methodological reflection pertains to our technical investigation. The customer reviews from Amazon.com, we gained candid insights into the play practices of children and parents as described from the viewpoint of adults. As the reviews are often written as an advice to others, these illustrate what is believed to be important by those that wrote up the reviews. They also refer to the context of play (setting up toys, parent's own interest in the toys, etc.). Such examples are insightful and highlight particular phenomena, but whether these can be generalized requires further investigation.

5.3 Future research

Value Sensitive Design is a highly iterative approach. As the project continues, we plan to perform two new research waves. Firstly, we will complement our investigations with Participatory Design sessions with various direct stakeholders. These will serve to ensure that children, (grand)parents and educators are given room to express in their own words or with their own playful products and self-created artifacts what they find imperative with regard to (hybrid) play.

Secondly, we will translate our findings into different prototypes, each aligning to a greater or lesser extent with the play beliefs and

types of adult involvement identified earlier. These prototyping activities will require additional conceptual, empirical and technical investigations where we will:

- Investigate whether additional sensitivities are called for, in particular, sensitivity to digital literacy
- Widen our scope to children's and educators' play beliefs and the involvement of peers and pre-school stakeholders in young children's facilitated play
- Evaluate prototypes through playtesting, involving all direct stakeholders, to validate to what extent and how these prototypes facilitate particular forms of intergenerational play and how children and adults respond to them

6. CONCLUSION

Young children's play is a 'facilitated' experience in several ways. It is shaped both by the playful products that are used as well as the situation in which it takes place. Parents are an inextricable part of the social context of play. The different ways by which parents perceive, mediate and engage with children's play can be accounted for to some extent in the design of facilitated (hybrid) play. The design instrument provided in this paper helps designers and researchers to position their own approach in this regard, and compare it to the preferences of other stakeholders in the design process.

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8. ANNEX

8.1 Survey questions

Table 1 provides an overview of the survey questions that led to the results that were discussed in this paper. Codes q1 to q7 have been used in Section 4 (Findings) to refer to these questions.

Table 1. Survey questions referred to in findings.

Ref	Question	Response
q1	What do you prefer for your child between 4 and 6 years old?	(single choice) Digital games, Physical games, I have no preference
q2	*In case of preference in q1*: What is the added value of *digital games/physical games* for you?	(open question)
q3	The following questions pertain to your child between 4 and 6 years old: How often… *Questions based on parental mediation scales by Nikken and Jansz (2014) for each mediation style*	(single choice) Never, Rarely, Occasionally, Regularly, Very often (or Does not apply)
	e.g. (How often) do you play a digital game together with your child, because your child wants to? *(co-use)*	
q4	How long can your child (between 4 and 6 years old) use a tablet without interruption?	(single choice) Between 0 and 15 minutes, Between 15 and 30 minutes, Between 30 and 60 minutes, Longer than 60 minutes, Unlimited
q5	Who installs apps on the tablet(s)? *Same question was asked with regard to smartphone(s)*	(multiple choice) Me, My partner, My child(ren), Other
q6	*In case children install apps on the tablet according to q5:* Does your child / do your children have to ask for permission to install an app on the tablet(s)? *Same question was asked with regard to smartphone(s)*	(single choice) Yes, No, It depends
q7	How important do you think… …the role of the school is in guiding children in the digital world? … the role of the parents is in guiding children in the digital world? … the role of peers is in guiding children in the digital world?	(single choice) Not important at all, Not important, Neutral, Important, Very important

8.2 Hybrid cases

Several hybrid playful products were referred to in the customer reviews quoted in this paper. Table 2 offers some basic background information and short description of these cases in order of appearance.

Table 2. Hybrid playful products quoted in customer reviews.

Case	Background and description
Tiggly Counts	Producer: Tiggly (2014) Ages: 3-7 http://get.tiggly.com/counts/ Tiggly Counts is a set of magnetic counting rods that interact with learning apps on tablets. It comes with free apps that connect children to a playful world of math learning.
EyePet – PS3	Producer: SCE London Studio, Playlogic Game Factory - Sony Computer Entertainment (2009) Ages: All ages http://www.playstation.com/en-us/games/eyepet-ps3/ EyePet is a game for PlayStation 3 that allows players to create, customize and care for their own virtual screen-oriented pet using motion

	controls.
Laser Pegs 8-in-1 Sports Car Building Set	Producer: Laser Pegs (2013) Ages: 5-8 http://www.laserpegs.com/shop/kits/power-block-sports-car/ This building set contains physical bricks that are compatible with LEGO sets and can be used to build different car models, which can be lit up using special bricks.
Angry Birds Indoor and Outdoor 3D Action Game	Producer: University Games (2012) Ages: 5-15 http://www.ugames.com/university_games/AngryBirdsActionGame.asp This is a physical version of the popular mobile game, in which players can score by slinging birds at a wooden construction containing pigs.
Sphero - App Controlled Robotic Ball	Producer: Orbotix (2012: v1.0 and 2013: v2.0) Ages: All ages http://www.gosphero.com http://www.gosphero.com/sphero-2-0/ Sphero is a robotic ball, designed to work with a mobile device, that can be used to play a variety of games.
Ubooly - pink, new model	Producer: Ubooly (2003) Ages: 3-9 http://www.ubooly.com Ubooly is a plush toy designed to fit a mobile device, combined with a free app to encourage kids to pretend, explore, run, jump, dance and be imaginative in the real world.

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